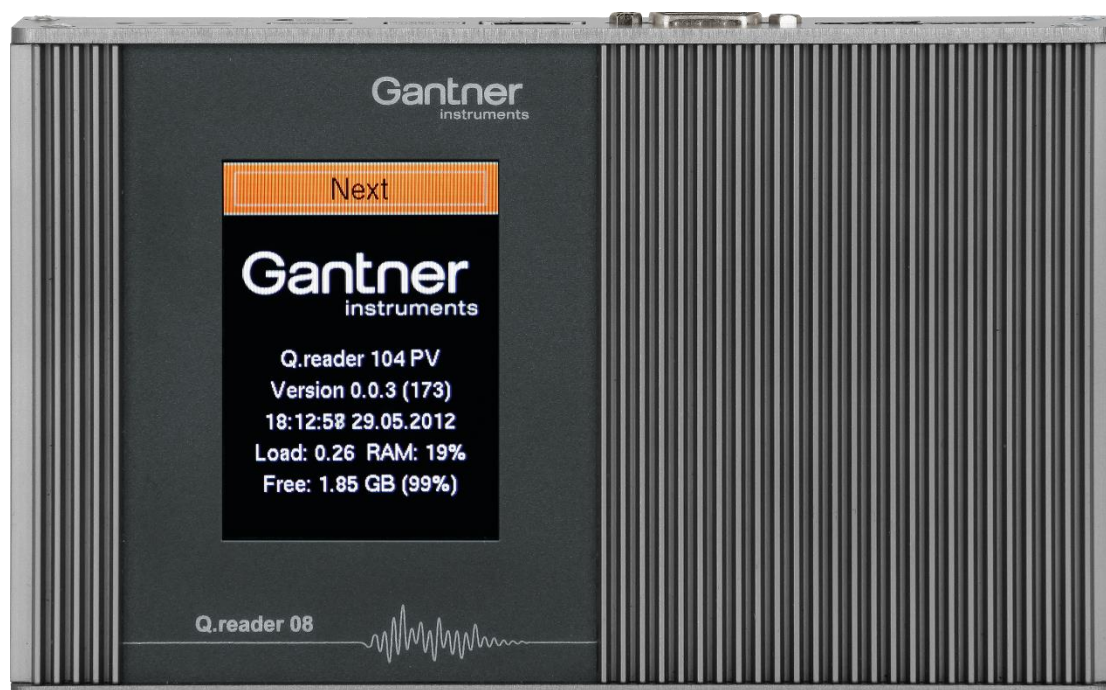




# Q.reader PV

## Instruction Manual

20150713





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1. Installation, commissioning, operation and maintenance of the product purchased must be carried out in accordance with instructions, i.e. in accordance with the technical conditions of operation, as described in the corresponding product documentation.
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3. If there are still some points on which you are not entirely clear, please do not take a chance, but ask the customer adviser responsible for you, or ring the Gantner Instruments Environment Solutions GmbH hot line.
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We wish you a successful application of our appliances. We will be pleased to welcome you as a customer again soon.

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## 1. ABOUT THIS MANUAL

This manual describes the installation and setup of the **Data Acquisition and Logging Module Q.reader** from Gantner Instruments Environment Solutions GmbH. The Q.reader module is a data logging module with integrated measurement capabilities.

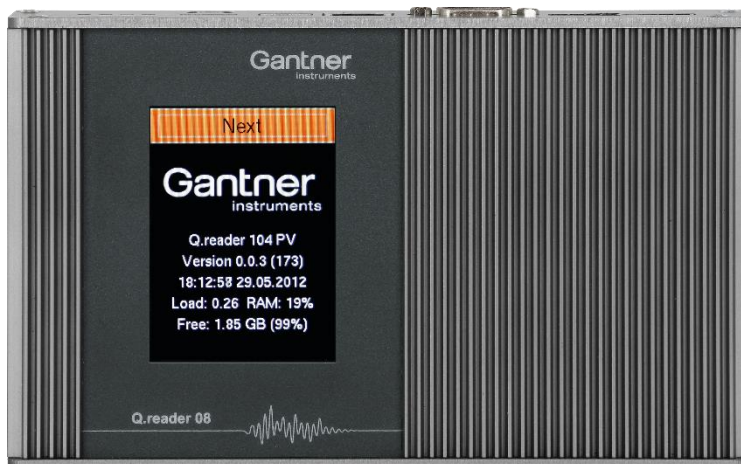
The following information can be found in this manual:

- Description of the Q.reader system with detailed information on the hardware and module features.
- A start-up guide which describes how the Q.reader is put into operation.
- Installation description of the Q.reader and how the module is connected to the power supply and bus lines.
- Description of the different types of measurement of the Q.reader.
- An introduction on how the Q.reader modules are configured with Webfrontend.
- Technical specifications of the Q.reader.

## 2. SYSTEM DESCRIPTION

The **Data Acquisition Module Q.reader** is a Data Logger, used for the industrial and experimental testing technology, especially for the multi-channel measurement of electrical signals of thermal or mechanical data at test beds and test sites.

The Q.reader provides the advantages of a remote structure and at the same time high precision, dynamic and flexible PAC (programmable automation controller) functionality. Eight analog inputs as well as the possibility to define conditioning, combinations, control functionalities, sequencing, mathematical calculations and data logging independently are available. The unit provides six configurable digital in- and outputs for thresholds, alarms, taring, trigger, and two relay outputs as well as an 128 MByte data memory, which can be divided into different memory depths, logging rates and trigger conditions. Additionally this module has an RS485 slave interface to connect additional Q.reader E (expansion module) or e.bloxx modules and an Ethernet interface.



*Picture 2.1 - Front View of the Q.reader Module*

The following instruction will show the simple setup of an Q.reader system:

1. Installation, chapter 3.1
2. TCP/IP-Setup, chapter 3.4
3. Sensor connection and configuration, chapter 4
4. Read online measurement values, chapter 3.8 and measurement buffer, chapter 3.9

For several applications the system will be connected to a superior system. Therefore the Q.reader provides several interfaces such as the Modbus TCP/IP, USB slave, USB master and it can be connected to any SCADA package using one of the standardised interfaces.

For more details on the e.commander software please refer to chapter 3.2

### 3. START-UP

This chapter describes how the module Q.reader is set into operation, the way it is set-up and which way measurement values can be read by using the Webfrontend.

The chapter will just give a short introduction so it is possible to check the correct function of the Q.reader module. Detailed information on the installation and set-up can be found later in this manual.

In order to work with an Q.reader module you need the following parts:

- Q.reader module
- Ethernet cable, cross wire for direct connection to PC or normal one for connection to a network

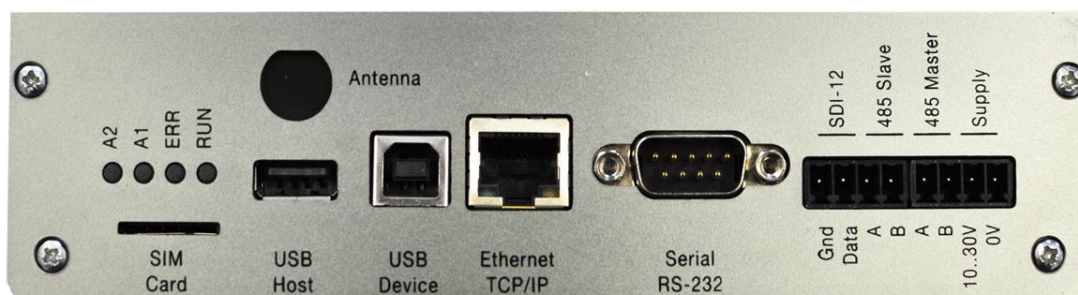
#### 3.1 Supply and Connection of the Q.reader



Use the Q.reader module only within the allowed environmental conditions (see technical data). The protective system is IP 20 (not water-proof) and the allowed temperature range for operation is -20 up to +60°C.

An Q.reader module can be connected either to a local network or directly to a PC/laptop via Ethernet. The standard operation is to connect the Q.reader to Ethernet for integration into a local network.

After connection the Q.reader has to be supplied with a DC voltage in the range of +10 to +30 VDC. The power input of the Q.reader is protected with an internal fuse (reversible) against excessive voltage and polarity connecting error. The power supply cables are connected to the screw terminals "Supply" "10..30V" and "0 V".



**Figure 3.1** - Power Supply and Bus Connection of the Q.reader

When turning on the power supply the LED "RUN" of the Q.reader will light up orange and a few seconds later start blinking blue. After 30 seconds the Q.reader is ready for work.

#### 3.2 Finding an Q.reader on the Ethernet

Each device on an Ethernet has a unique address. These addresses are used to find and communicate with the corresponding devices. On delivery the address of an Q.reader is set to 192.168.10.1 as default, with DHCP set to OFF.

Default Network settings:

IP address = 192.168.10.1



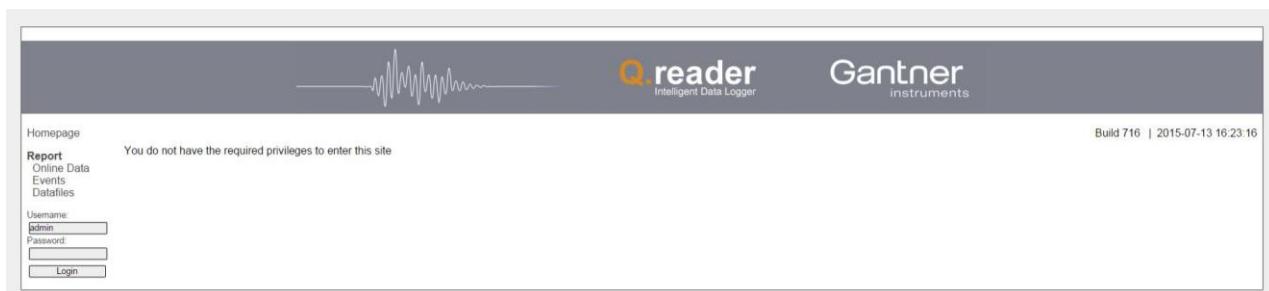
- Subnet mask = 255.255.255.0
- Gateway = 192.168.10.201
- DNS = 8.8.8.8

If the Q.reader could not be found there might be one of the following problems:

1. Connection problem: Check that the Q.reader is connected correctly to the Ethernet and the power is supplied to the module (LED "RUN" is blinking blue).
2. The IP address of the Q.reader does not fit to the network it is connected to.
3. Wrong DHCP settings: By default the DHCP setting of an Q.reader is set to OFF. In this case the Q.reader will use the configured static IP address.
4. The IP address of the Q.reader conflicts with another device on the network: In this case refer to the next chapter 3.4 to change the IP address.

### 3.2.1 Configuration of Q.reader

To configure the settings of an Q.reader use a web browser. Go to the Q.reader configuration page at the default IP address 192.168.10.1



Here all the settings for the Q.reader are available. You can change all the settings directly in this browser interface. Beside the interfaces and setting the logging functionalities can be defined as well.



## **4. HARDWARE INSTALLATION**

### **4.1 Environmental Conditions**

The Q.reader is protected against water and dirt according IP 20. If required by the conditions of the operating site the modules have to be installed accordingly, e.g. in a water-resistant or water-proof case, compliant with the regulations of electrical engineering.

For the allowed ambient temperatures for the Q.reader see the Technical Specifications at the end of this manual.

### **4.2 Mounting**

The Q.reader has a snap-on mounting for installation on standard profile rails 35 mm (1.4 inch) according to DIN EN 50022. The mounting on the DIN rail is performed by four straps on the reverse side of the module. First you push the two lower straps behind, the lower notch of the DIN rail and then you press the module on the DIN rail until the two upper straps snap in to the upper notch.

In order to take the module off the DIN rail either slide the module side-wards off the rail or, if it is not possible, lift the module slightly so that the straps on the top are released from the notch and the module can be taken off easily by tipping it forwards and removing it from the DIN rail.



### 4.3 Module Parts

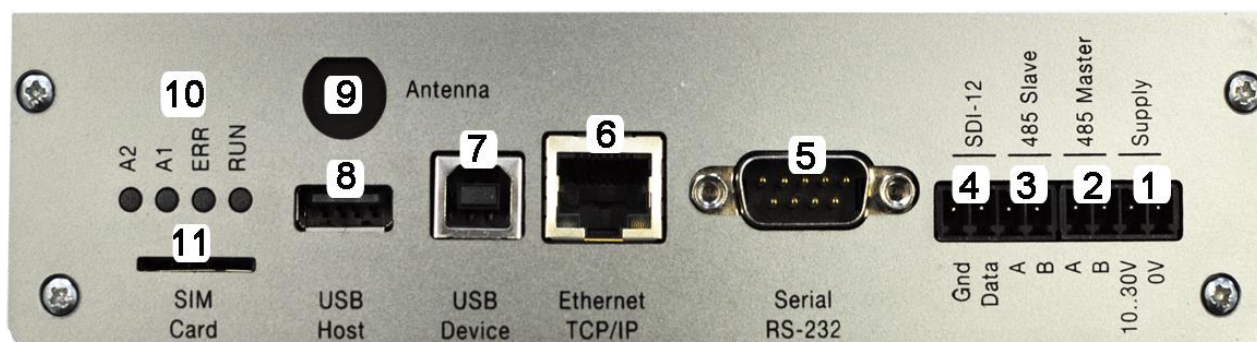


Figure 7.1. – Module Parts of the Q.reader

1 to 4... Pluggable screw-type terminal strips:

- 1 .... Power Supply +10 up to 30 VDC RS 485 serial bus for connection to a PC/laptop
- 2 .... 485 Master serial bus "Serial 1" for connection to Sensor/Inverter
- 3 .... 485 Slave serial bus "Serial 2" for connection to Sensor/Inverter
- 4 .... SDI12 (Option)

5 .... RS 232 serial bus for connection to a PC/laptop (Service Gantner)

6 .... RJ 45 plug for Ethernet connection

7 ... USB Device interface (Option)

8 ... USB Host interface (Option)

9 ... GSM/3G antenna (Option)

10 .. GSM/3G SIM card (Option)

11 ...status LEDs

- 1 ....RUN This LED indicates the CPU state
- 2 ....ERR This LED indicates the Error state
- 3 ....A1 (Option)
- 4 ....A2 (Option)

### 4.4 Connection Technique

The wires for the power supply, serial interfaces RS 485, SDI and for the sensor signals are connected to the Q.reader via screw-type terminals. The captive terminal screws are part of the terminal strips. All terminal strips are of a plug-in type and can be detached from the Q.reader.

Not more than 2 leads should be connected with one clamp. In this case both leads should have the same conductor cross section. For the precise clamping of stranded wire we recommend the use of wire-end ferrules.

**Notice:** Connecting wires respectively the plugging-in and -out of the terminal strip is only allowed with an Q.reader in power-off status.

In order to prevent interference with sensors, signals and modules, shielded cables have to be used for the power supply, bus connection and signal lines.

For the connection of the Ethernet a standard RJ 45 connector is provided by the Q.reader.

## 4.5 Power Supply

Non-regulated DC voltage between +10 and +30 VDC is sufficient for the power supply of the modules. The input is protected against excess voltage and polarity connecting error. The power consumption remains approximately constant over the total voltage range, due to the integrated switching regulator.

Due to their low current consumption the modules can also be remotely supplied via longer lines. Several modules can be supplied in parallel within the permissible voltage range and drop in the lines. If required, the supply lines together with the bus line may be incorporated in one cable.

In order not to overload the module power supply needlessly and to avoid unnecessary line troubles, a separate power supply is recommended for sensors with a large current drain.

The distribution voltage for the Q.reader modules has to be protected by a fuse with maximum 1 A (inert). The modules have an internal fuse (reversible) for protection against excess voltage, excess current and wrong polarity.

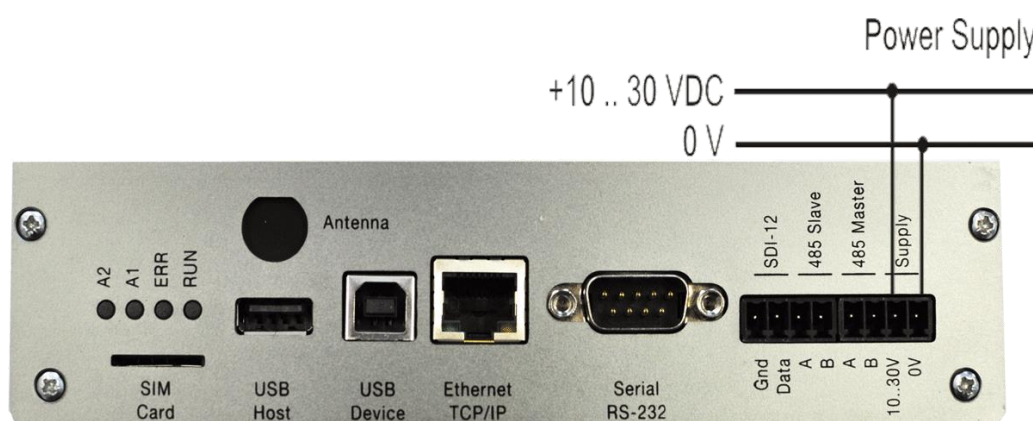
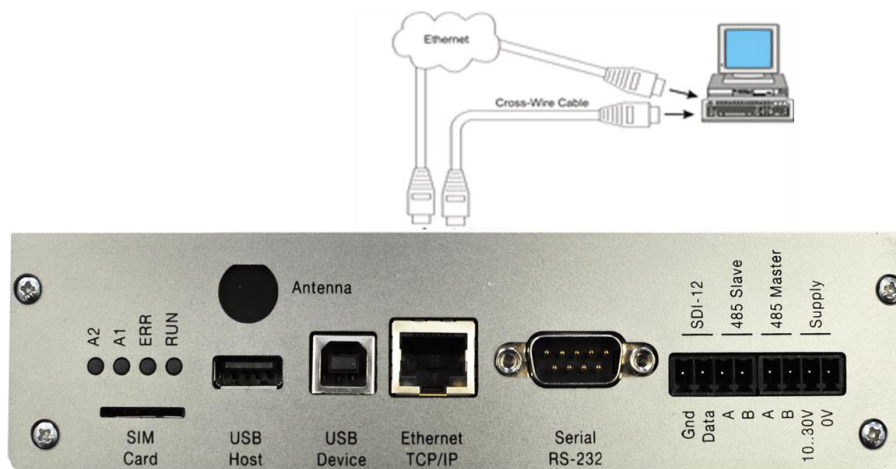


Figure 7.2. - Power Supply of the Q.reader

## 4.6 Connection to Ethernet

The Q.reader is supported with a connector 10/100 BaseT to connect the Q.reader into an Ethernet. The IP address and DHCP setting must be set-up correctly (see chapter 3 "Start-Up"). Then it is possible to communicate with the Q.reader via the ethernet.

It is also possible to connect the Q.reader directly to a PC via the 10/100 BaseT connector. In this case a cross-wire Ethernet cable must be used.



*Figure 7.4. - Connection to Ethernet*

## 4.7 Connection to the RS 485 Communication Bus

The Q.reader has two RS 485 serial interface. The bus lines are connected to the screw terminals "485 Master" and "485 Slave" of the Q.reader.

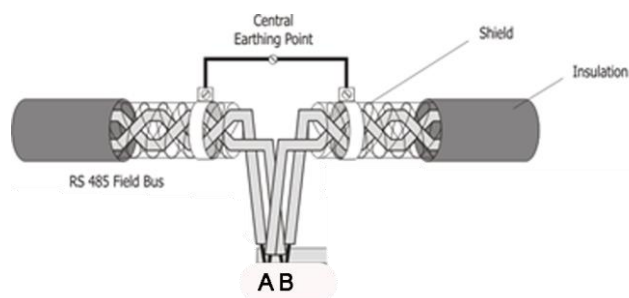
485 Master	RS 485 serial bus "Serial 1" for connection to Sensor/Inverter
485 Slave	RS 485 serial bus "Serial 2" for connection to Sensor/Inverter

## 4.8 Shielding RS 485

In case of increased interference, such as in industrial areas, we recommend a shielding of the power supply, bus, and signal cables. In general, the shield should be connected to the protective earthing (not Data ground!) at each bus connection. If necessary, the shield should also be applied along the course of the cable several times. For shorter distances, e.g. with stub cables, the interference response is often improved if the shielding is only applied to the stub cable exit.

Bus users such as controllers (PLCs), computers (PCs), repeaters and interface converters (ISK), etc., generally feature the possibility of applying the shield directly to the appliance or to separate shield rails. Shield rails offer the advantage of preventing possible interfering signals from reaching the appliance. The shields which are connected to protective earthing conduct interference signals off before reaching the module.

The Q.reader does not have a direct shield connection at the module. Here the shield of the bus cable can be connected to earth e.g. by so-called shield clamps.





**Figure 7.5.** - Earthing of the Bus Line Shield at an Q.reader

**Notice:** The shielding screen must not be connected to the ground (0V) of the power supply and it should always be connected to earth with a large surface and low-inductance.

## 4.9 Digital Inputs

The digital inputs of the Q.reader can be used for “power management functions”. The inputs have an excess voltage protection (transil diodes), which comes into action at approx. 33 V. The maximum permissible input voltage amounts to 30 V.

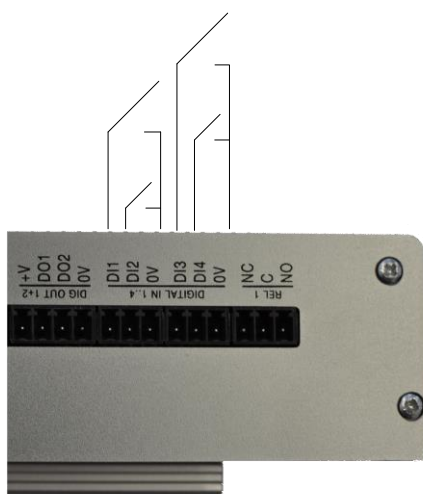
### Mode “pullup”

Input voltages between 3.5 VDC and 30 VDC (open DI) are interpreted as logic LOW (“0”), input voltages lower than 1.0 V (switch closed) as logic HIGH (“1”).

Digital									
Connector	Name	Active	Save	Average	Mode	Unit	Factor	Offset	Precision
DIN1	DIN1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0
DIN2	DIN2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0
DIN3	DIN3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0
DIN4	DIN4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0

**Figure 4.1.** – Configuration of the Digital Inputs

To test the digital contacts, bridging these two without power.

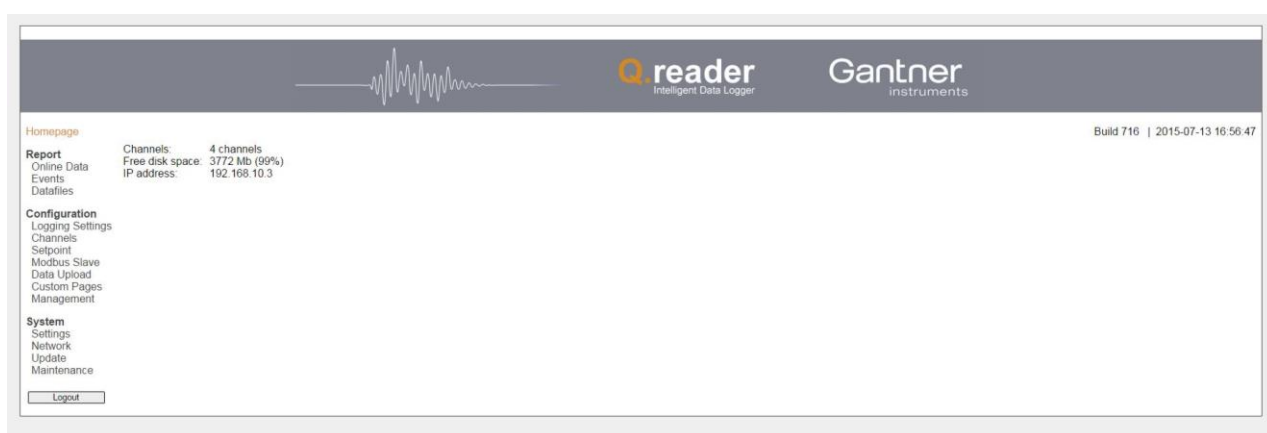


## 5. CONFIGURATION

To configure an Q.reader and read the measured and logged values from the Q.reader the Q.reader web frontend is used. This chapter will give you an overview on how to configure an Q.reader module.

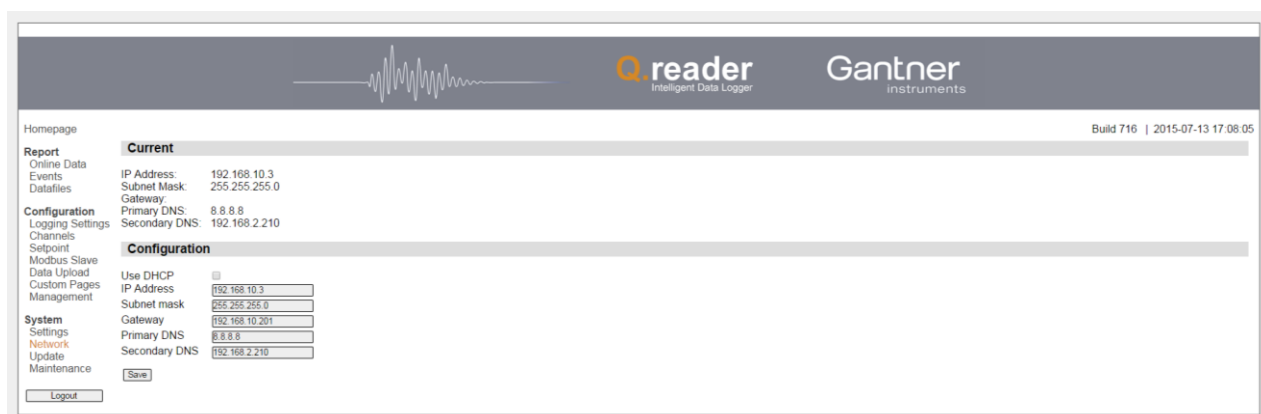
### 5.1 General Q.reader settings

The standard way of configuring an Q.reader module is to connect the Q.reader to the Ethernet first. Then the Q.reader is reachable by a web browser at the individual IP address (default 192.168.10.1). Now it is possible to reconfigure the module and finally update the Q.reader with the new configuration.



Following is a short overview of the setting possibilities. By clicking with the mouse on a setting a help text for the selected setting will be shown in the lower area of the window.

#### 5.1.1 Network Settings





### 5.1.2 Date and Time and Time sync

Each Q.reader has an internal real-time clock for timing information.

The screenshot shows the 'Date and Time' configuration page in the Q.reader web interface. The page has a sidebar with navigation links: Report, Configuration, and System. The main content area is divided into three sections: 'Date and Time', 'Time Zone', and 'Time sync'. In the 'Date and Time' section, the 'Current Date' is 13 July 2015, 17:20:34. Below it, there are input fields for 'New Date' with labels Day, Month, Year, Hour, Minute, and Second. The 'Time Zone' section shows a 'Timezone' dropdown set to 'Denver' and an 'Apply DST' checkbox checked. The 'Time sync' section has a 'Sync time' checkbox unchecked. At the bottom of each section is a 'Save' button. The top right of the page shows 'Build 716 | 2015-07-13 17:20:36'.

## 5.2 Configuration of the Variables of an Q.reader

### 5.2.1 Digital Inputs and Analog Inputs (Option)

The screenshot shows the 'Analog/Digital' configuration page in the Q.reader web interface. The page has a sidebar with navigation links: Report, Configuration, and System. The main content area is divided into two sections: 'Analog' and 'Digital'. In the 'Analog' section, there is a table with columns: Connector, Name, Active, Save, Average, Mode, Unit, Factor, Offset, and Precision. The table contains four rows for AIN1, AIN2, AIN3, and AIN4. In the 'Digital' section, there is a similar table with columns: Connector, Name, Active, Save, Average, Mode, Unit, Factor, Offset, and Precision. The table contains four rows for DIN1, DIN2, DIN3, and DIN4. At the bottom of the page are 'Save' and 'Cancel' buttons. The top right of the page shows 'Build 716 | 2015-07-13 16:48:59'.

Connector	Name	Active	Save	Average	Mode	Unit	Factor	Offset	Precision
AIN1	AIN1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	volt 1v single	V	1	0	0
AIN2	AIN2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	volt 1v single	V	1	0	0
AIN3	AIN3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	volt 1v single	V	1	0	0
AIN4	AIN4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	volt 1v single	V	1	0	0

Connector	Name	Active	Save	Average	Mode	Unit	Factor	Offset	Precision
DIN1	DIN1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0
DIN2	DIN2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0
DIN3	DIN3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0
DIN4	DIN4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	pullup		1	0	0



### 5.2.2 Serial RS 485 Communication Interface

Homepage

Build 716 | 2015-07-13 16:59:17

Report  
Online Data  
Events  
Datafiles

Analog/Digital Serial 1 Serial 2 Ethernet Arithmetik Setpoint

Serial 1

Configuration  
Logging Settings  
Channels  
Setpoint  
Modbus Slave  
Data Upload  
Custom Pages  
Management

Active	Protocol	Interval	Baudrate	Databits	Parity	Stopbits	Timeout	Min Wait	Retries
<input checked="" type="checkbox"/>	Modbus RTU	1s	19200	8	none	1	100	0	0

Device	Address	Byteorder	Wordorder	Blocks	Comment
new device	1	MSB	MSB	No gaps	

System  
Settings  
Network  
Update  
Maintenance

(Huawei SUN2000) (Add new device)

Save Cancel

Logout

### 5.2.3 Ethernet Communication Interface

Homepage

Build 716 | 2015-07-13 17:12:05

Report  
Online Data  
Events  
Datafiles

Analog/Digital Serial 1 Serial 2 Ethernet Arithmetik Setpoint

Ethernet

Configuration  
Logging Settings  
Channels  
Setpoint  
Modbus Slave  
Data Upload  
Custom Pages  
Management

Active	Protocol	Interval	Timeout	Outstanding	Retries
<input checked="" type="checkbox"/>	Modbus TCP	1s	200	2	0

Device	Ip-Address	Port	Address	Byteorder	Wordorder	Blocks	Comment
new device	192.168.0.0	502	0	MSB	LSB	Aggressive	

Name	Active	Save	Average	Type	Direction	Unit	Factor	Offset	Precision	Default	Error Reset	Register	Register Offset	Order	Interval	Comment
new value	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	float32	in		1	0	2	0	3	00001	Automatic	100	-- see above --	

no template (Add new device)

Save Cancel

Logout

### 5.2.4 Arithmetic Variables

Homepage

Build 716 | 2015-07-13 17:17:26

Report  
Online Data  
Events  
Datafiles

Analog/Digital Serial 1 Serial 2 Ethernet Arithmetik Setpoint

Arithmetik

Configuration  
Logging Settings  
Channels  
Setpoint  
Modbus Slave  
Data Upload  
Custom Pages  
Management

Active	Mode	Interval
<input checked="" type="checkbox"/>	Programmable	1s

Device	Comment
new device	

Value	Active	Interval	Save	Average	Type	Unit	Factor	Offset	Precision	Code	Order	Comment
cycle_counter	<input checked="" type="checkbox"/>	-- see above --	<input checked="" type="checkbox"/>	<input type="checkbox"/>	float32		1	0	2	~=(++1) % 60	200	

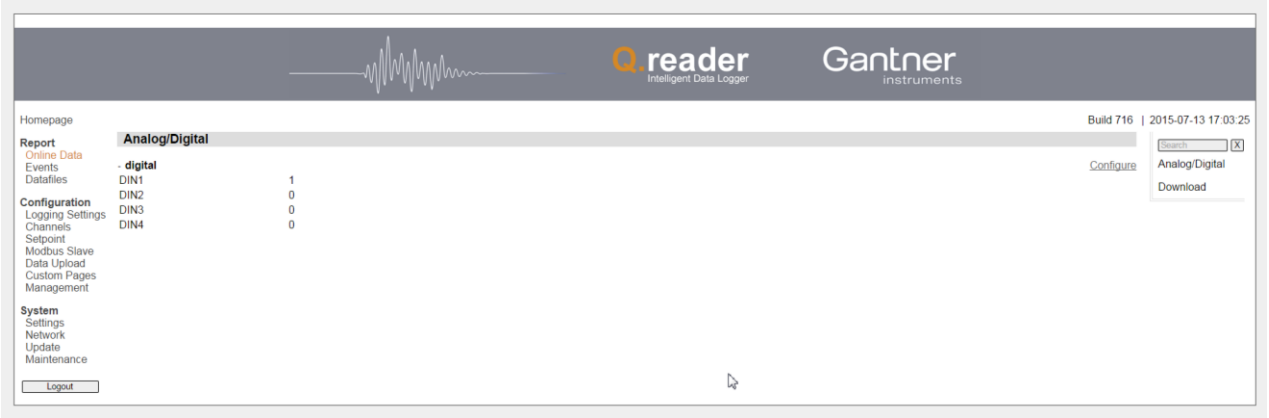
no template (Add new device)

Save Cancel

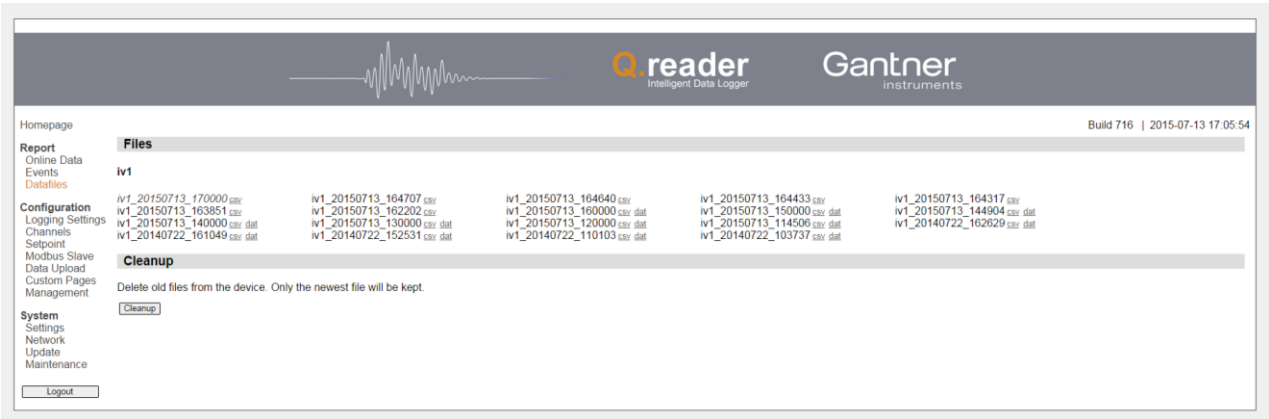
Logout



5.3 Display Online Data



5.4 Read Logged Data



The Q.reader saves all measured values in its internal memory.

## 6. SPECIFICATIONS

All following data are valid after a warm-up time of approx. 45 minutes.

### 6.1 Digital Input (4 per module)

Input	
Functionality	Power management
Input voltage	max. +30 VDC
Input current	max. 1,5 mA
Input frequency	1 Hz

### 6.2 Relais Outputs (Optionper module)

Functionality	Closer
Current	max. 1 A
Voltage	max. 60 VDC

### 6.3 Data Memory

Flash (non volatile)	4 GB on SD card (included)
RAM (volatile)	64 MByte
Logging Interval	1 s up to 24 h individual per channel

### 6.4 Interfaces

RS 485	2
RS 232	1
USB Client	1
Ethernet TCP/IP	1
SDI-12	1 (Option)
Data Formats:	8E1, 8N1 selectable
Protocols:	ASCII, MODBUS-RTU (parts) Inverter and Sensor protocols
Baud Rates:	2.4it/s up to 115.2 kbit/s

### 6.5 Power Supply

Power supply	10 VDC to 30 VDC over voltage and overload protection
Power consumption	approx. 3 W



## 6.6 Mechanical

Case:	Aluminium and ABS
Dimensions (W x H x D):	170 x 110 x 40 mm
Weight:	800 g
Protective System:	IP 20
Mounting:	DIN EN-Rail

## 6.7 Connection

Plug-In screw terminals	Wire cross-section up to 1.5 mm <sup>2</sup>
Ethernet	RJ 45 plug

## 6.8 Modem (Optional)

GSM/GPRS 850/900/1800/1900 band

## 6.9 Environmental Conditions

Operating Temperature	-20 °C to + 60 °C (-4 °F to + 140 °F)
Storage Temperature	-30 °C to +85 °C (-22 °F to + 185 °F)
Relative humidity	0% up to 95% at +50 °C (+122 °F), non-condensing

## 6.10 Electromagnetic Compatibility

Electro static discharge (ESD)	level 2 acc. IEC 801-2: 4 kV
Radiated electromagnetic Fields	level 3 acc. IEC 801-3: 10 V/m
Electrical fast transients	level 3 acc. IEC 801-3: 2 kV / 1 kV
Radiated RFI/EMI	level B acc. VDE 0871-1/CISPR 11

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### Notice:

Information in this manual are valid as of July 10<sup>th</sup> 2015 until revocation.  
Further changes and completion of the manual are reserved and possible without notice.

Part No. of Q.reader: 289839